

REMARKS

By this response, no claims have been amended, cancelled or newly added. Thus, claims 1-20 remain pending. Reconsideration based on the following remarks is requested.

Remarks to Arguments in the Office Action

The Office Action argues that Hasegawa is an analogous reference because Hasegawa discloses the same apparatus as recited in claim 1. Applicant respectfully disagrees. First, claim 1 recites a lithographic apparatus. The apparatus as shown in Figure 2 of Hasegawa is not a lithographic apparatus. Moreover, the Office Action has not established why a person having ordinary skill in the art would reasonably have been expected to solve the problems addressed by the present invention of removing contamination, such as hydrocarbons, in a lithographic apparatus, by considering the teachings of Hasegawa to provide a water-repellent layer on a resin surface on a liquid jet head.

The Office Action also argues that McGinnis is an analogous reference and that it was not intended to disclose a lithographic apparatus. Again, Applicant submits that McGinnis is not an analogous reference and the Office Action still has not established that a person having ordinary skill in the art would reasonably have been expected to solve the problems addressed by the present invention by considering the teachings of McGinnis addressing the problem of contamination of a substrate surface prior to GaN homoepitaxy growth using molecular beam epitaxy.

Remarks to Rejections in the Office Action

Claims 1-2, 4-6, and 8-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable by U.S. Patent No. 6,225,032 to Hasegawa *et al.* ("Hasegawa") in view of the Journal of Crystal growth 222 (2001) 452-458 by McGinnis *et al.* ("McGinnis") and in further view of U.S. Patent No. 6,252,648 to Hase *et al.* ("Hase"). Applicant respectfully traverses this rejection.

Applicants respectfully traverse this rejection for *at least* the reason that a *prima facie* case of obviousness has not been established. Claims 1-2, 4-6 and 8-20 are patentable for *at least* the reasons that: (1) the Office Action relies on non-analogous references for the rejection; (2) assuming arguendo that Hasegawa and McGinnis are not deemed non-analogous, Hasegawa, McGinnis and Hase, or any proper combination thereof, do not teach or render obvious each and every feature of the claims; and (3) assuming arguendo that Hasegawa and McGinnis are not deemed non-analogous, there is no legally proper teaching,

suggestion, or reasoned basis to modify Hasegawa to include the teachings of McGinnis and Hase.

1. The Office Action's reliance on Hasegawa with McGinnis is improper as these references are non-analogous references to Applicant's claimed invention.

- a. Hasegawa is Non-analogous Art

A two step test has been developed to determine whether a particular reference is within the appropriate scope of the prior art. First, it must be determined whether a particular reference is "within the field of the inventor's endeavor." Second, assuming the reference is outside that field, it must be determined whether the reference is "reasonably pertinent to the particular problem with which the inventor was involved." *In re Deminski*, 796 F.2d 436, 230 U.S.P.Q. (BNA) 313, 315 (Fed. Cir. 1986).

The Office Action has not established that Hasegawa is an analogous reference. The inventor's field of endeavor relates to providing a lithographic projection apparatus with in-situ control of molecular contamination (for example, radiation-induced carbon contamination, which causes the formation of films on optical elements), by utilizing a composition including one or more perhalogenated C₁-C₆ alkanes; and one or more compounds including one or more nitrogen atoms and one or more atoms selected from hydrogen, oxygen and halogen. *See* Specification, *e.g.*, pgs. 3-4, paragraphs [0009] and [0012] and pgs. 10-11, paragraphs [0041]-[0043].

Hasegawa states that its field of endeavor relates to a method and apparatus for manufacturing liquid jet heads wherein a resin ceiling plate of the head is grooved, drilled, or the like by the irradiation of a laser beam. *See* Hasegawa, *e.g.*, col. 1, lines 9-13. This is clearly a very different field of endeavor.

Since Hasegawa is outside the present inventors' field of endeavor, the inquiry becomes whether this reference is reasonably pertinent to the particular problem(s) with which the present inventors were involved. It is not. The present inventors' problem relates to efficiently and selectively removing contamination, such as hydrocarbons, in a lithographic apparatus, desirably without causing damage to, for example, EUV mirror surfaces and using a material with low light absorption such that the introduction of such material into the optical train has little or no adverse effect on transmissivity.

Hasegawa is concerned with the problem of providing a water-repellent layer on the resin surface on a liquid jet head. *See* Hasegawa, *e.g.*, col. 2, lines 48-67. These are very different problems with very different solutions.

The Office Action has not established that a person having ordinary skill in the art would reasonably have been expected to solve the problem of removing contamination, such as hydrocarbons, in a lithographic apparatus, by considering the solution in Hasegawa to Hasegawa's problem of providing a water-repellent layer on a resin surface on a liquid jet head. The Office Action is completely devoid of any evidence to support this position.

b. McGinnis is Non-analogous Art

In addition, the Office Action has not established that McGinnis is an analogous reference. McGinnis states that its field of endeavor relates to a metalorganic chemical vapor deposition-grown GaN on 6H-SiC substrates. *See* McGinnis, *e.g.*, page 1. This is a very different field of endeavor than the present inventors' field.

Since McGinnis is outside the present inventors' field of endeavor, the inquiry becomes whether this reference is reasonably pertinent to the particular problem(s) with which the present inventors were involved. It is not. As discussed above, the present inventors' problem relates to efficiently and selectively removing contamination, such as hydrocarbons, in a lithographic apparatus, desirably without causing damage to, for example, EUV mirror surfaces and using a material with low light absorption such that the introduction of such materials into the optical train has little or no adverse effect on transmissivity.

McGinnis is concerned with the problem of contamination of a substrate surface prior to GaN homoepitaxy growth using molecular beam epitaxy. *See*, McGinnis *e.g.*, pg. 452. These are very different problems with very different solutions.

The Office Action has not established that a person having ordinary skill in the art would reasonably have been expected to solve the problem of removing contamination, such as hydrocarbons, in a lithographic apparatus, by considering the solution in McGinnis to McGinnis' problem of contamination of a substrate surface prior to GaN homoepitaxy growth using molecular beam epitaxy. The Office Action is completely devoid of any evidence to support this position.

2. The cited portions of Hasegawa, McGinnis and Hase or any proper combination thereof do not teach or render obvious the claims.

Even assuming arguendo that Hasegawa and McGinnis are not deemed non-analogous, the cited portions of Hasegawa, McGinnis and Hase, or any proper combination thereof do not teach or render obvious each and every feature of the claims.

For example, Applicant submits that the cited portions of Hasegawa, McGinnis, and Hase, and any proper combination thereof, do not teach or render obvious a lithographic projection apparatus comprising, *inter alia*, a space in the apparatus comprises a composition to remove a contaminant from a surface of the apparatus, the composition containing (a) and (b), wherein (a) is one or more perhalogenated C₁-C₆ alkanes and (b) is one or more compounds including one or more nitrogen atoms and one or more atoms selected from hydrogen, oxygen and halogen as recited in claim 1.

Moreover, Applicant submits that the cited portions of Hasegawa, McGinnis, and Hase, and any proper combination thereof, do not teach or render obvious a device manufacturing method comprising, *inter alia*, producing reactive species of a composition to remove a contaminant from a surface, wherein a space through which the beam passes comprises the composition containing (a) and (b), wherein (a) is one or more perhalogenated C₁-C₆ alkanes and (b) is one or more compounds including one or more nitrogen atoms and one or more atoms selected from hydrogen, oxygen and halogen as recited in claim 19.

The Office Action cites the abstract, col. 3, lines 60-67, col. 4, lines 1-67, col. 5, lines 58-67, col. 6, lines 12-67, col. 7, lines 1-13 and 38-67, col. 8, lines 1-24, col. 11, lines 10-39 and 64-67 and col. 12, lines 1-19 of Hasegawa as teaching claims 1 and 19 except for the composition used to remove a contaminant from a surface of the apparatus and containing one or more nitrogen atoms (for which McGinnis is relied on). Respectfully, Applicant disagrees.

As discussed above, Hasegawa discloses a method and apparatus for manufacturing liquid jet heads and for providing a water-repellent layer on the resin surface on a liquid jet head. In particular, Hasegawa states that:

Now, however, when drilling is made by a technique of the kind for the formation of discharge ports, the byproducts that are created at the time of laser processing and allowed to adhere to the processing surface of the ceiling plate. Then, the surface energy per hour becomes higher on the portions where the byproducts have adhered, and the resultant wettability becomes higher

with respect to the recording liquid. In other words, such surface becomes hydrophilic.

In order to enhance the discharge efficiency of the recording liquid at its discharge ports of a liquid jet head, it is desirable to make them water-repellent in order to avoid any stronger interaction between liquid and resin.

Hasegawa, col. 2, lines 40-51. To make the byproducts water-repellent, Hasegawa discloses exposing the byproducts to a fluorine atmosphere to make the byproducts water repellent. In this regard, Hasegawa discloses:

It is then attempted to fluorinate the surface of the byproducts. In this way, the chemical modification is performed on the surface of the byproducts that causes the surface energy to rise when adhering to the blank. The surface of the byproducts are thus fluorinated so as to suppress the phenomenon that may bring about the local hydrophilicity on the surface of the discharge port plate due to the adhesion of the byproducts. At the same time, this method enables the water-repellency of the related surface to be enhanced more than the conventional art.

Hasegawa, col. 7, lines 57-65. Thus, the cited portions of Hasegawa do not teach or render obvious a composition to remove a contaminant (e.g., the byproducts - "there is no need for the provision of any special processes in order to remove the byproducts" Hasegawa, col. 14, lines 40-41) but rather merely teaches applying a fluorine atmosphere to make the byproducts water-repellent. Indeed, the process of Hasegawa adds material, and does not remove a contaminant. Moreover, the cited portions of Hasegawa fail to provide any teaching or suggestion regarding a composition including one or more nitrogen atoms.

Therefore, Applicant submits it is clear that the cited portions of Hasegawa fail to teach or render obvious a composition to remove a contaminant from a surface of the apparatus, the composition containing (a) and (b), wherein (a) is one or more perhalogenated C₁-C₆ alkanes and (b) is one or more compounds including one or more nitrogen atoms and one or more atoms selected from hydrogen, oxygen and halogen.

Further, the cited portions of McGinnis and Hase fail to overcome the deficiencies of Hasegawa. The cited portions of McGinnis fail to provide any teaching regarding a lithographic apparatus. Moreover, the cited portions of McGinnis and Hase fail to provide any teaching regarding a composition to remove a contaminant from a surface of a lithographic apparatus, the composition containing one or more perhalogenated C₁-C₆ alkanes. Rather, the cited portions of McGinnis merely provide disclosure of ammonia cleaning and annealing for metalorganic chemical vapor deposition-grown GaN on 6H-SiC

substrates. Moreover, the cited portions of Hase merely disclose providing an inert gas containing a small amount of oxygen which results in the production of ozone for removing an organic compound deposited on an optical element.

Therefore, the cited portions of Hasegawa, McGinnis and Hase, and any proper combination thereof, fail to teach or render obvious claims 1 and 19.

3. There is no legally proper teaching, suggestion, or reasoned basis to modify Hasegawa to include the teachings of McGinnis and Hase.

Even assuming arguendo that Hasegawa and McGinnis are not deemed non-analogous, there is no proper teaching, suggestion, or reasoned basis to modify Hasegawa to include the teachings of McGinnis and Hase. The Office Action alleges that McGinnis, on pages 452-453, discloses that an ammonia flux is introduced into a plasma atmosphere. [Office Action, page 3]. The Office Action then alleges that it would have been obvious to modify Hasegawa by introducing the plasma atmosphere with ammonia because McGinnis discloses that the ammonia flux introduced into the plasma beam resulted in the inhibition of surface roughening and produced a relatively smooth substrate surface. [Office Action, page 4].

As discussed above, McGinnis describes metalorganic chemical vapor deposition-grown GaN on 6H-SiC substrates, which is cleaned by annealing the substrate in an ammonia flux. It is not clear that McGinnis discloses introducing an ammonia flux into a plasma atmosphere. Pages 452-453 of McGinnis appear only to discuss plasma in the context of prior studies by others, not in terms of their work. Indeed, McGinnis teaches away from plasma by stating that “prolonged nitrogen plasma exposure...causes surface damage” McGinnis, pg. 452.

Moreover, there is no reasoned basis, teaching or suggestion that McGinnis’ ammonia flux would have a similar effect on the liquid jet recording heads of Hasegawa. Indeed, Hasegawa is not at all concerned with cleaning a contaminant, unlike McGinnis. Further, the environments of McGinnis and Hasegawa are completely dissimilar – McGinnis relating to metalorganic chemical vapor deposition while Hasegawa relating to a method and apparatus for manufacturing liquid jet heads wherein a resin ceiling plate of the head is grooved, drilled, or the like by the irradiation of a laser beam. Indeed, McGinnis and Hasegawa have little if anything in common with each other and a person skilled in the art certainly wouldn’t

look to either of these references to modify the other and the Office Action has provided no reasoned basis to explain why a person skilled in the art would look to McGinnis to modify Hasegawa.

Furthermore, the Office Action alleges that Hase, at column 3, lines 32-54, column 4, lines 38-60 and column 5, lines 33-35, discloses that the composition in the exposure apparatus can be utilized to clean the surfaces of the exposure apparatus. Moreover, the Office Action alleges that Hase, at column 4, lines 1-60, discloses that the oxygen and nitrogen is mixed in the projection system and is impinged with a laser light treatment that inherently produces oxides including oxides of nitrogen, such as nitrogen dioxide. [Office Action, page 4]. The Office Action then alleges that it would have been obvious to modify Hasegawa and McGinnis by purging the nitrogen and oxygen via the illumination system because Hase discloses that introducing nitrogen with small controlled amounts of oxygen enables the formation of ozone which in turn oxidizes any organic compounds deposited on the optical elements. [Office Action, page 4].

As discussed above, the cited portions of Hase merely describe providing an inert gas containing a small amount of oxygen which results in the production of ozone for removing an organic compound deposited on an optical element. There is no reasoned basis, teaching or suggestion that Hase's inert gas would have a similar effect on the liquid jet recording heads of Hasegawa. Again, Hasegawa is not at all concerned with cleaning a contaminant, unlike Hase. Further, the environments of McGinnis and Hasegawa are completely dissimilar – Hase relating to cleaning optical elements (i.e., lenses, mirrors or windows) while Hasegawa relating to a method and apparatus for manufacturing liquid jet heads wherein a resin ceiling plate of the head is grooved, drilled, or the like by the irradiation of a laser beam. Indeed, Hase and Hasegawa have little if anything in common with each other and a person skilled in the art certainly wouldn't look to either of these references to modify the other and the Office Action has provided no reasoned basis to explain why a person skilled in the art would look to Hase to modify Hasegawa.

For at least the reasons set forth above, a *prima facie* case of obviousness under 35 U.S.C. §103 for claims 1 and 19 has not been established. Claims 2, 4-6 and 8-18 are patentable at least by virtue of their dependency from claim 1, and for the additional features recited therein. Claim 20 depends from claim 19 and is allowable by virtue of its dependency from claim 19, and for the additional features recited therein. Accordingly, the rejection of claims 1-2, 4-6 and 8-20 should be withdrawn.

Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hasegawa in view of McGinnis and further in view of U.S. Patent No. 5,320,707 to Kanekiyo *et al.* ("Kanekiyo"). Since claim 7 is dependent from claim 1 and claim 1 stands rejected by the combination of Hasegawa, McGinnis and Hase, Applicant will assume that claim 7 stands rejected by the combination of Hasegawa, McGinnis, Hase and Kanekiyo. Applicant respectfully requests that this issued be clarified and, additionally, traverses this rejection.

Claim 7 depends from and claims additional features of claim 1. Since the cited portions of Hasegawa, McGinnis and Hase, individually or in any combination, do not teach or render obvious claim 1 and the cited portions of Kanekiyo do not remedy the defects of Hasegawa, McGinnis and Hase with respect to claim 1, dependent claim 7 is allowable by virtue of its dependence from an allowable base claim, and for the additional features it recites.

All rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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